OCTOBER
1969
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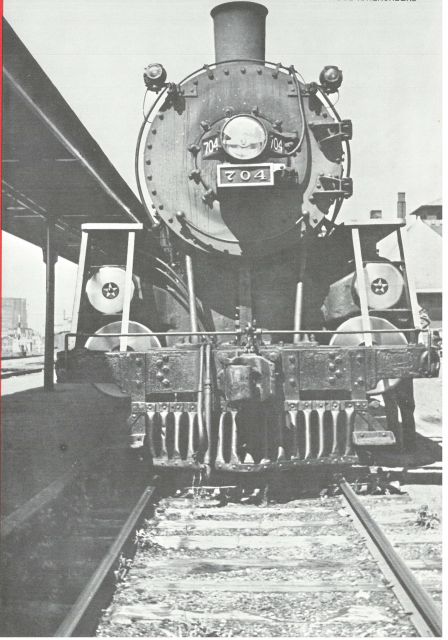
Live Steam

THE MONTHLY MAGAZINE FOR ALL LIVE STEAMERS AND LARGE-SCALE MODEL RAILROADERS



in this issue

The Pere Marquette's Pacifics

3rd Annual Live Steam Club Survey

Live Steam magazine

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COVER PHOTO

Pere Marquette #704, one of the first five of that road's 4-6-2 engines. Photo taken at Muskegon, Michigan, on June 21st, 1937 by Henry J. Walhout.

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The Pere Marquette's

Prepared from data supplied by Philip F. Geary, Jr.
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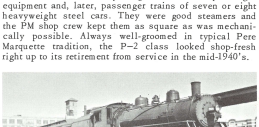
PHOTOS BY HENRY J. WALHOUT

Fate, at last, seemed to be smiling on the fledgling Pere Marquette in 1909. Only six years after it was formed in a merger of the Chicago & West Michigan, the Detroit, Grand Rapids & Western and the Flint & Pere Marquette in 1899, it had gone into bankruptcy. The 999 year lease made by the Cincinnati, Hamilton & Dayton in 1904 had been annulled in 1905 and the CH&D had relinquished control. But in 1909 things were looking a little better and the reorganization of a couple years back seemed to indicate a brighter future.

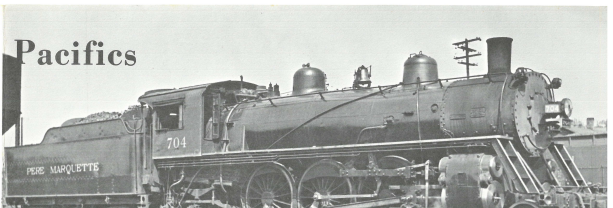
The merger had endowed the PM with a conglomoration of 4-4-0's, 2-6-0's and 2-8-0's to which the new company added 50 4-6-0's in 1902 and 1903 and 22 4-6-2's at various periods between 1901 and 1905. These had replaced an equal number of the 4-4-0's but they weren't able to keep pace with the larger trains and faster schedules.

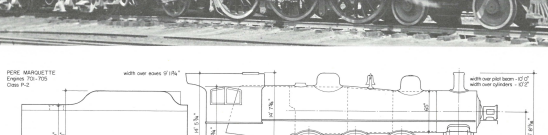
In the few short years since the Missouri Pacific and the Chesapeake & Ohio had put the first *Pacific* type engines into service in 1902, the PM's motive power staff had put together its own specifications for new passenger locomotives. Large 77" drivers would move fairly light trains at express train speeds over Michigan's comparatively level landscape and keeping 200# pressure in the relatively small boiler could be accomplished with a proportionately sized firebox.

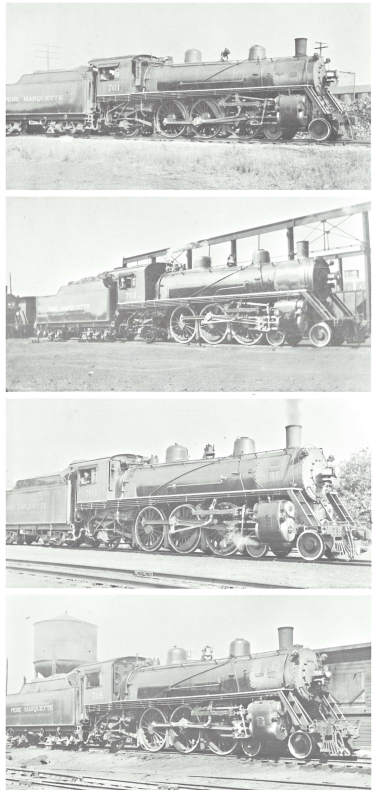
American Locomotive Works was given the order for five of the new passenger engines and in June of 1910 the 4-6-2's rolled out of the plant at Schenectady, New York. Numbered 701 through 705 and designated as Class P-2, they carried Alco's construction numbers 48001 through 48005. The design proved to be very satisfactory and for 35 years the P-2's ranged the Pere Marquette's 2,000 miles of track pulling truss-rodded passenger equipment and, later, passenger trains of seven or eight heavyweight steel cars. They were good steamers and the PM shop crew kept them as square as was mechanically possible. Always well-groomed in typical Pere Marquette tradition, the P-2 class looked shop-fresh right up to its retirement from service in the mid-1940's.



Pacifics




PERE MARQUETTE
Engines 700-705
Class P-2
width over eaves 9'-1⅞"
width over pilot beam - 10'-0"
width over cylinders - 10'-0"
7000 gallons - 14 tons (original tender)
5½"x 32" journals
6'-8"
6'-8"
6'-8"



Pere Marquette's Pacifics

As with most steam power, the P–2's ran the gamut of chores over their years of service. Mainline passenger duties at first, and then passenger runs on the feeder lines.

Henry Walhout is as ardent a fan of the Pere Marquette as any railroad could ever boast and he recalls:

In 1938 the 704 made at least 285 round trips between Muskegon and Holland in 9 months — April through December — sometimes running twice a day on the day and evening runs. Many of these trips found Charlie Dwyer at the throttle and others with Frank Dahlem, after he "bumped" Charlie. Also, in 1938, a couple of railfans named William Fitt and Henry Walhout rode the cab of the 704 from the Pere Marquette's North Yard roundhouse to the depot in Muskegon — which was quite a thrill in those days!

Photos of the 704 in 1936 show her with a 10,000 gallon — 16 ton capacity tender. In April 1938 she appeared with the 8,000 gallon — 11 ton capacity tender from 2–8–0 #621. In April 1939 she again had a 10,000 gallon — 16 ton tender.

Charles Dwyer described the 704 as a somewhat rough rider but a top-notch steamer, with her exhausts as evenly balanced as it was possible to obtain.

The day train between Muskegon and Holland consisted usually of a wooden baggage car and one or two steel coaches. The evening train was larger; steel baggage car, mail car, 2 or 3 steel coaches and 1 or 2 Pullmans which went through to Chicago by connection with a Grand Rapids train, usually pulled by a class SP–3 4–6–2.

I have seen the 704 on freight train to Hart, Michigan, on Boy Scout Specials from Chicago to Blue Lake Boy Scout Camp north of Muskegon and on snowplow duty to Hart using snowplow SP–14.

Equally devoted to Pere Marquette equipment is Phil Shuster, whose records write *finis* to the P–2's. The 701 was retired from service in July 1944 and dismantled at the PM's Wyoming Shops in September of that same year. The 702 remained in service until October 1945 and was sold to the Purdy Company in Chicago on January 30th, 1946. Engine 703 was retired in July 1944 and dismantled on October 12th, 1944 at the Wyoming Shops. Number 704 was also retired in July of 1944, dismantled at Wyom-Shops on September 15th, 1944. The 705 was removed from service in December 1944 and was dismantled on February 22nd, 1945 at the Wyoming Shops.

In 1911, a second group of Pacifics were added to the PM's roster. That class will be reviewed in the November issue of LIVE STEAM Magazine.

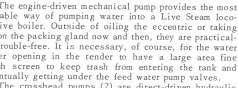
PART TWO

FEED WATER SYSTEM

FEED WATER PUMPS AND INJECTOR

The engine-driven mechanical pump provides the most reliable way of pumping water into a Live Steam locomotive boiler. Outside of oiling the eccentric or taking up on the packing gland now and then, they are practically trouble-free. It is necessary, of course, for the water filler opening in the tender to have a large area fine mesh screen to keep trash from entering the tank and eventually getting under the feed water pump valves.

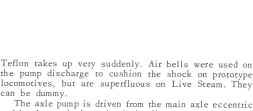
The crosshead pumps (2) are direct-driven hydraulic rams connected to the crosshead. One is located on each side and was used on Early Americans and other locomotives of that period. For Live Steam, they are usually



CROSSHEAD PUMP

bronze bodies with brass or stainless steel rams. They operate without trouble and the glands are usually packed with graphite twine. Teflon makes an excellent packing, but care must be exercised during gland adjustment since Teflon takes up very suddenly. Air bells were used on the pump discharge to cushion the shock on prototype locomotives, but are superfluous on Live Steam. They can be dummy.

The axle pump is driven from the main axle eccentric and is also a single acting hydraulic ram. A combination



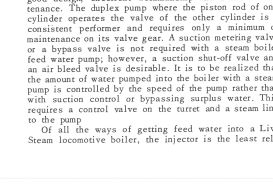
AXLE PUMP

of bronze body and stainless steel ram with one O-Ring creates a trouble-free pump. The O-Ring eliminates the packing gland that requires adjustment. A squirt of SAE 30 or 40 oil on the ram at the start of the day's run will lubricate the ram for all day. Since the SAE automobile engine oils have such a high flash point, any oil that may work past the O-Ring will not hurt the boiler. The best combination for the eccentric and eccentric strap is bronze and cast iron, although cast iron and cast iron is

excellent. On horizontal pumps, locate the suction valves on the bottom and the discharge valves on the top; this will help get rid of air. Do not attempt to operate with the valves laying on their sides. And above all, make certain that there are ball lift stops, since if there are no stops, the ball can either float and fail to seat itself or, in some cases, lift and shut off the water on the suction side or, lift and form a seal on the discharge side creating a hydraulic lock and possibly tearing the pump loose from the chassis. Make certain that the balls are either bronze or stainless steel (stainless steel preferred). Carbon steel (bearing balls) will rust in a hurry and will become worthless as far as sealing off water pressure is concerned.

The steam boiler feed pump that simulates a duplex air pump has proven to be a very satisfactory way of getting water into a boiler. The simplex pump, on the other hand, is not the most reliable pump in the world. It is a single cylinder pump with a shuttle valve to distribute steam to the both ends of the steam cylinder. In this writer's experience with the simplex pumps at sea, many of them would get temperamental and would have to be pried to one end with a pinch bar to get them restarted. In fairness to some model builders who have built simplex pumps that operate consistently good, this writer will say that a good operating pump of any type shows good design, excellent workmanship and careful maintenance. The duplex pump where the piston rod of one cylinder operates the valve of the other cylinder is a consistent performer and requires only a minimum of maintenance on its valve gear. A suction metering valve or a bypass valve is not required with a steam boiler feed water pump; however, a suction shut-off valve and an air bleed valve is desirable. It is to be realized that the amount of water pumped into the boiler with a steam pump is controlled by the speed of the pump rather than with suction control or bypassing surplus water. This requires a control valve on the turret and a steam line to the pump

Of all the ways of getting feed water into a Live Steam locomotive boiler, the injector is the least reliable. However, as the scale of the locomotive gets larger, the reliability does improve. These small injectors are very sensitive to both low and high steam pressure. Also, if the steam control valve leaks slightly, which makes the injector too hot, the injector will refuse to put water into the boiler. The owners of the 1½" scale Northems eliminate the problem somewhat by using the small size commercial injector, but they still have their problems. The injectors made for 1" and 1½" scale locomotives work fairly well when distilled water is used, but when feed water with a high lime content is used, their reliability is very poor. The orifices in these small injectors are so small that the least lime deposit will change orifice ratios so that the injector will not operate. A water shut-off valve is recommended for the suction line to prevent the tender from draining through the low-mounted injector when the injector is not pumping water. Oversize suction lines and valves will help, and, where a line filter is used to keep small foreign particles from fouling the injector, it must be made from a fine mesh bronze wire cloth with a large area (60 to 100 mesh recommended) and must be capable of being removed from the tender for cleaning. Air leaks into the suction line of any feed water pumping device are disasterous to operation.



INJECTOR SYSTEM

BOILER CHECK VALVES

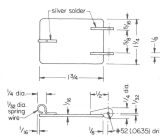
Boiler check valves are usually located on the outside center line of the boiler, just behind the front tube sheet, although on some prototype locomotives, they were mounted on top of the boiler adjacent to the front tube sheet. It is to be noted that double check valves in series were sometimes used on prototype locomotives. This provided a safety factor particularly where injectors were used since it prevented live steam from backing up to the injector and overheating it, thereby preventing the injector from starting. Where a high mounted injector was used, a problem was created since the injector was above the water level in the tender which made it a little difficult to cool down the injector to get it started. This is no problem when mechanical pumps are used on Live Steam locomotives since the discharge valve acts as a second check valve. Leaking boiler check valves might possibly make the difference between an erratic injector and a consistent one on Live Steam locomotives.

As previously mentioned, feed pumps that will pick up water with no discharge head to work against may refuse to start pumping against a full head of steam. This is because the pump is airbound and the piston (or ram) is merely recompressing the same air over and over again, and due to the clearance inside the pump, the compression inside the pump isn't high enough to lift the discharge valve and discharge air against boiler pressure. To assure operation, a globe valve must be installed between the pump and the check valve to bleed off air and also to check the overboard discharge of water for pump operation. Air gets into the pump suction line when the locomotive is uncoupled from the tender, by running out of water, a leaking packing gland on the pump, or a poor hose connection. There are times when some foreign material may lodge under one of the pump valves. By opening the overflow, the pump can be made to operate at full capacity, which in many cases will dislodge any foreign material. For the simplest system, the engine pump suction may work directly on the hand pump discharge line. For the more sophisticated system, the hand pump and the engine pump would each have its own circuit with its own check valve. A bypass valve would connect the hand pump discharge to the engine pump suction. A check valve is required on the engine suction line to prevent the hand pump from pumping back into the tender. During operation with the bypass open, the hand pump will pump through the engine pump due to pressure differential. This will remove air from an airbound pump and will, in most cases, dislodge foreign material from under the valves.

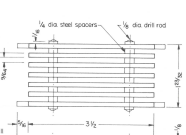
building the RARITAN

by William H. Morewood

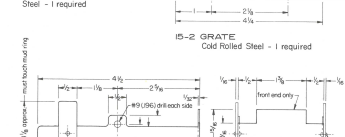
boiler parts



15-1 FIREBOX DOOR
Steel - 1 required



15-2 GRATE
Cold Rolled Steel - 1 required



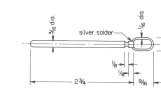
15-3 ASH PAN
Steel - 1 required

When fabricating the Firebox Door (15–1), the friction bracket on the boiler should be bent so that it will just rub on the spring wire loop on the door. A chain fastened to this loop and to the right front corner of the coal bunker makes it easy to pull the door open on the run.

The Grate (15–2) is located in the firebox by the notches in the side bars. The grate should be as loose a fit as possible without being able to slide off at one end and cock. You will note that it sits on one pin and is kept from tipping by the two longer side bars. It should be free to rock a little on the pin.

The Ash Pan (15–3) is supported by another pin. These pins should fit freely in the holes in the plate extending from the boiler so that they may be easily pulled out. The groove in the pins is to prevent them from vibrating loose.

The Gauge Glass Fittings (15–5, –6) are designed to take a glass of approximately 3/16" o.d. The glass may be sealed with an "O" ring at either end or with graphited pump packing. See that the bore has no oil film. Soap and water and a pipe cleaner do an effective job.



15-4 GRATE PIN
Steel - 2 required

15-6 BOTTOM GAUGE GLASS FITTING
Brass - 1 required

15-7 GAUGE GLASS PLUG
Brass - 4 required

15-5 TOP GAUGE GLASS FITTING
Brass - 1 required

15-8 GAUGE GLASS NUT
Brass - 2 required

Hobby growth evident in

Third Annual Live Steam Club Survey

by Stephen Vitkovits, Jr.
Golden Gate Live Steamers

Live Steam interest in the United States is fast surpassing that of England to such an extent that it is difficult for us to comprehend here in Japan.

Mr. Yamazaki, Editor
Tetsudo Mokei Shumi
"The Hobby of Model Railroading"

An excellent 80% return of questionnaires mailed to Live Steam Clubs in the United States and Canada gave a good cross-section of membership, club organization, locomotive distribution by gauge and club track footage.

In the first section are clubs that have reached maturity; that is, they have not recently changed their membership or track footage by large amounts. The track site is generally not part of any member's private residence. Within this group 1/3 own their site, 1/3 have a track in a public place (usually a park), and 1/3 rent or lease a site. Since clubs in this group have greater administrative responsibilities, it is not surprising that over 70% of them are incorporated. Clubs in this group are likely to play host to visiting steam clubs once or twice a year and, on occasion, host the Brotherhood Meets. This group is generally characterized by a club newspaper, large membership, higher club dues and occasional social functions.

CLUB TRACK LOCATION	Founded	Regular Members	TRACK FOOTAGE 2½"	3½"	4½"	5"	7¼"	7½"	12"
EASTERN LIVE STEAMERS, INC. Riverside Park, Lyndhurst, N. J.	1940	11	740	1000	1000				
GOLDEN GATE LIVE STEAMERS, INC. Redwood Regional Park, Oakland, CA	1939	128	1330	1330	2660				1330
GOLETA VALLEY RR CLUB, INC. Private Property, Santa Barbara CA	1957	27							5000
IOWA MODEL STEAM ENGINEERS, INC. Private property, Robins, IA.	1950	34			525	525			900
LOS ANGELES LIVE STEAMERS, INC. Griffith Park, Los Angeles, CA	1957	173			1000	2200			3000
MONTREAL LIVE STEAMERS, INC. Club property, Cedars, Quebec	1934	20			770	950		950	
NEW JERSEY LIVE STEAMERS, INC. Club property, Liberty Corner, N. J.	1961	52			780	780		1100	
OMAHA AREA LIVE STEAMERS, INC. Club property, Papillion, Nebraska	1967	5				750			
ONTARIO SUNPARLOUR LINE. Leased site, Windsor, Ontario	1962	11			650	650			
PACIFIC NORTHWEST LIVE STEAMERS, INC. Leased site, Portland, Oregon	1963	70				4000			4000
PENNSYLVANIA LIVE STEAMERS Leased site, Paoli, PA	1946	45	600	600	1800				
PETERBOROUGH LIVE STEAMERS Club property, Peterborough, Ontario	1958	18			300				
PIONEER VALLEY LIVE STEAMERS, INC. Club property, Southwick, MA	1952	90			770	770			3200
RED RIVER VALLHALA Rented site, Winnipeg, Manitoba	1938	13	970	970			970		
RIVERSIDE LIVE STEAMERS, INC. Hunter Park, Riverside, CA	1965	45			1200				6500
SOUTHEASTERN LIVE STEAMERS Private property, Charlotte, NC	1952	9		1800					
SOUTHERN CALIFORNIA LIVE STEAMERS Private property, Los Angeles, CA	1948	73		800	1600				800
WABASH, FRISCO & PACIFIC ASSN. Club property, Clencoe, MO	1939	32							4900
WAUSHAKUM LIVE STEAMERS Leased site, Holliston, MA	1954	–		1000					

The second group is comprised of clubs that don't have a club layout, but instead run on one or more of the members' tracks. Generally, these clubs are not incorporated and have smaller memberships. Many don't have elected officers or formal meetings.

CLUB LOCATION	Founded	Regular Members
ADDISON VALLEY LIVE STEAMERS Westchester, Illinois	1949	14
ATLANTIC LIVE STEAMERS Rothesay, New Brunswick	1958	10
BRITISH COLUMBIA LIVE STEAMERS Vancouver, B. C.	1968	
CENTRAL MINNESOTA LIVE STEAMERS St. Cloud, Minnesota	1967	
CHICAGO MODEL ENGINEERS ASSN. Chicago, Illinois	1913	
FLORIDA STEAM N GAS ENGINEERS Clearwater, Florida	1940	65
GREAT LAKES LIVE STEAMERS Livonia, Michigan	1950	12
INLAND EMPIRE LIVE STEAMERS Lewiston, Idaho	1968	8
JAMUL VALLEY RAILROAD Jamul, California	1965	
LAKE SHORE LIVE STEAMERS Cleveland, Ohio	1968	14
LaPORTE COUNTY HISTORICAL STEAM SOCIETY Michigan City, Indiana		
MID-SOUTH LIVE STEAMERS Franklin, Tennessee	1966	6
MICHIGAN STEAM LOCOMOTIVE CLUB Davison, Michigan	1967	32
MILWAUKEE LIGHT ENGINEERING SOCIETY Milwaukee, Wisconsin	1969	42
NIAGARA FRONTIER LIVE STEAMERS Buffalo, N. Y.	1967	18
NORTHWEST OHIO LIVE STEAMERS Akron, Ohio	1969	24
PENSACOLA LIVE STEAMERS Pensacola, Florida	1967	12
PUGET SOUND LIVE STEAMERS Sedro Woley, Washington		15
RAILROADER'S CLUB OF SAN ANTONIO San Antonio, Texas	1965	16
REBEL LIVE STEAM ASSN. East Point, Georgia	1966	7
ROCKY MOUNTAIN LIVE STEAMERS Denver, Colorado	1947	10
SACRAMENTO VALLEY LIVE STEAMERS Sacramento, California	1968	24
ST. LOUIS LIVE STEAMERS St. Louis, Missouri	1968	9
SOUTHERN MINNESOTA LIVE STEAMERS Rochester, Minnesota	1960	36
TRI-COUNTY LIVE STEAMERS Anaheim, California	1952	15
WEST VALLEY LIVE STEAMERS Cupertino, California	1963	39

The third group of clubs are presently constructing a club track and, most likely, they will find that this phase will show the greatest rate of achievement and produce the highest *esprit-de-corps*. Further, although a lot of work has to be done, those that do it will have a lot of fun!

CLUB LOCATION	Founded	Regular Members
CINDER SNIFFERS, INC. Building 3½" and 7½" combined track near Dover, Indiana	1956	21
COLORADO LIVE STEAMERS, INC. Building 688' of 3½" and 4½" track at Denver, Colorado	1969	12
GULF COAST CHAPTER – NRHS, INC. Building 440' of 3½" and 4½" track at Houston, Texas	1968	6
JOSHUA TREE & SOUTHERN RR CLUB Constructing 15" track near Joshua Tree National Monument California	1967	3
LONG ISLAND LIVE STEAMERS, INC. Building 800' of 3½", 4½" and 7¼" track at East Patchogue, N. Y.	1966	13
NORTHERN ILLINOIS LIVE STEAMERS, INC. Constructing 1700' of 3½", 3000' of 4½" and 3500' of 7½" track at Orland Park, Illinois	1967	59

Fourth, we have a group of clubs that are in the process of organizing. Many are already negotiating for a club track site.

CLUB LOCATION	Founded	Regular Members
FINGER LAKES LIVE STEAMERS Rochester, N. Y.	1969	53
FRONTENAC SOCIETY OF MODEL ENGINEERS Kingston, Ontario	1969	9
PHOENIX LIVE STEAMERS Phoenix, Arizona	1966	12
TORONTO LIVE STEAMERS Mississauga, Ontario	1969	20
UTAH LIVE STEAMERS Salt Lake City, Utah	1969	

In the late sixties, there has been an energetic spurt in club forming and one wonders if this trend will continue. For example, looking back to about 1946, one or two clubs a year were started. However, there were four in 1966, seven in 1967, two in 1968 and seven clubs started in 1969.

The distribution of membership, steam locomotives and track footage is as follows:

SCALE:	½"	¾"	1"[1]	1½"[2]	3"
Steam Locomotives					
Running					
1967	20	258	240	233	6
1969	36	262	205	229	7
Under Construction					
1967	10	89	113	177	9
1969	10	121	149	222	8
Track Footage					
1966	6012	13182	14982	21400	–
1967	5327	17012	16917	29375	4700
1969	3640	11770	19330	25880	4900
Membership in all Live Steam Clubs					
1967	756				
1968	1240				
1969	1397				

[1] Includes 5" gauge
[2] Includes 7¼" and 7½" gauges

Only club track footage was reported this year instead of combined club and private which will explain the drop in some figures. Even so, 1" scale showed an increase.

With an increase of 85% in Live Steam Club membership in the past two years there is no doubt that the Live Steam hobby is fast becoming "of age!" For the address of a person to contact for more club information, see the Live Steam Club listings on pages 104 to 108 in the BLS Directory.

LAYOUT for the apprentice

Part 1

by Jack D. McKenty, M.D.

Laying out, or marking out, consists of making marks and lines on the workpiece to act as guides for subsequent operations. It can be as trivial as a pencil mark on a piece of wood to tell where to start a saw cut, or it can be a most elaborate procedure, involving expensive and delicate optical instruments.

Our kind is comparatively simple, but care must be taken. It has been said that more good work is ruined by poor layout than any other cause.

Basic Equipment

Surface plate: This is a piece of cast iron or granite which is *flat*. They are expensive, but a cheap substitute is a big chunk of plate glass. The size you need is determined by the work you are doing, but 12 x 18 inches is a good size.

Unless the surface it rests on is flat as well, the glass will bend a little and can throw things off. Ideally, the glass should be bedded in a shallow tray full of plaster-of-paris. It is set in while the plaster is still soft, and forms its own level bed.

Do not try to get along without a surface plate. Its use is not essential for flat work, but for anything in three dimensions it is almost mandatory.

Layout dye: or marking out fluid, is a sort of paint put on the surface of the work to make marks stand out better. The commercial item, available from our advertisers, comes in a little can with its own brush. The dye can be left on the finished workpiece to prevent rusting, and unless you are a real fuss-pot, you can paint right over it.

For castings, rub chalk, or light colored artist's pastels, on the surface. This usually lets marks show better than the standard purple layout dye.

Other possibilities include Aero dope, in various colors (red is nice); "magic marker;" or any of the blunt felt tip pens. The color wears off quickly, but is very handy for simple jobs.

If you like fooling around with chemicals, dissolve copper sulphate (Blue stone) in water until it won't dissolve any more, and add a few drops of nitric acid. When swabbed on steel this liquid will deposit a thin layer of copper, which lets marks show up beautifully. The steel must be clean.

Punches and Hammers: Two punches are needed: A "prick punch" with a sharp point, and a "center punch" with a blunt one. The center punch makes a shallow dent which give drills a place to start from. The prick punch makes a dent which is smaller in diameter and gives a starting place for scribers, dividers, and center punches.

A four-ounce machinist's or ball peen hammer is about the right size to hit the punches with.

Rules: Sometimes called "scales". The little 65¢ six-inch rule (with a table of decimal equivalents on the back) is great to carry in your shirt pocket but don't use it for layout – the marks are painted on only. For accuracy we require rules with the marks cut into the metal. Six-inch and twelve-inch sizes are almost mandatory, and for bigger work a 24" rule is useful, but the price goes up in geometric proportion to the length. A twelve-inch rule may be $5.50, but the two-foot job is $12.00.

There are several arrangements of divisions on a rule. Perhaps the most useful is with eighths and sixteenths on one side, and 32nds and 64ths on the other. An aircraft rule has 50ths and 100ths on one side. Or you might prefer to have one side metric. Whatever turns you on!

Machinist's Square: A 2" square will find constant use. They also come 4", 6", and larger. These squares are sometimes a surprise to apprentices when they are first seen, since they have no markings on them at all. Their advantage is that they are *square*. They are precision tools and must be treated as such. If one is dropped it should not be used again until it is checked against another on the surface plate.

Combination Square: This is a 6" or 12" gadget which can do the job of the previously mentioned 2" and 4" squares. It is a rule carrying a square head and a center finder. The twelve-inch can also have a protractor. While it *can* do the job of separate rule and squares, it is usually handier to have all three items: one or more rules, one or more squares, and the combination square. The six-inch is handier, but the twelve-inch has a protractor. I don't know which to advise – I have the six-inch, but I suspect I will end up with both. Unfortunately, the parts are not interchangeable between the two sizes.

Dividers: Are similar to the ones in your school geometry kit, but are precision with a screw adjustment. The 4" is mandatory; the 2" and 6" are nice additions.

For greater distances than a 6" or 8" divider will reach, a "trammel" can be used. This is a wood or metal bar along which can slide little carriages carrying the points. Not necessary except for very large work, most long distances can be stepped off with ordinary dividers with reasonable accuracy.

Hermaphodite calipers: In England, "odd leg" or "jennys." One leg is like a divider, the other is like a caliper. A must in at least the 4" size.

Scribers: A scriber is a hard steel rod with a point on one or both ends. Used for scribing marks and leaving little notes to yourself on the work surface. A tiny scriber comes in each combination square. Carbide scribers are more expensive – about $2.00 but worth the money.

Jeweler's loupe: Not essential, but useful. It tends to keep your placement of punch marks more accurate, since small errors show up as big ones when seen through the loupe.

Accuracy: Not something you can buy at the store, but an essential ingredient in layout work. It is usually possible to keep the placement of all marks on the work accurate to within half of 1/64 of an inch, or about .008 inch. Many claim you should be able to work to less than .005 inch, over the whole surface of the work.

Purchasing tools: The most painless way of building your collection is by buying the tools one at a time, as you need them. As with most things, Sears offers a good selection at reasonable prices.

If you have some ready cash, consider buying a kit. Starrett, and Fowler, among others, offer a basic set of tools for students and apprentices. The combination usually sells at a substantial discount compared with the total price of the individual tools.

The sets are not for layout only; they usually include a micrometer or vernier caliper, or both. (About which more later). If you have a choice, get a dial caliper instead of a vernier. It is so much easier to read that it is well worth the extra money.

...from the cupola

Some changes in LIVE STEAM Magazine this month should really catch your eye!

The first one you noticed was probably the envelope in which this issue was mailed and the second would be the addition of color. If you like those items, tell Caldwell Industries when you order your copy of their new 1970 Catalog, for it is through this kind of cooperation from Live Steam Suppliers that LIVE STEAM Magazine will continue to grow and improve. Caldwell Industries has found that Live Steamers read LIVE STEAM Magazine and that response comes from their advertising in *this* publication.

Another feature in this issue is the first of a series of four articles on full-size locomotives . . . which should be of interest to Live Steamers as well as the new readers we hope to find among those whose interest is with that type of motive power. Material of this nature will continue to be presented in an effort to build up circulation.

The Live Steam Club Survey in this issue shows that the number of clubs has more than doubled in the three years that LIVE STEAM Magazine has been published, and that club membership has increased by 85% in the past two years.

While many Live Steam Suppliers advertise exclusively in LIVE STEAM Magazine, some (whose business is entirely Live Steam) still allocate 90% of their advertising budget to HO gauge oriented publications and 10% to LIVE STEAM Magazine. . . . and there are a few Live Steam Suppliers who do not advertise at all but rely on this staff to furnish their name and address to readers who inquire.

LIVE STEAM Magazine, like any publication, needs the support of advertising from the suppliers it assists. From its very start, Caldwell Industries has led the way. With regular support of this kind from all able suppliers to our hobby, LIVE STEAM Magazine could reach you every month in the protective cover of mailing envelopes . . . and we could add the additional pages we so badly need.

As we said before, if you like the envelopes and appearance of this issue, order a copy of the new 1970 catalog from Caldwell Industries and *tell them* of your appreciation.

— W. C. F. —

Scheduled Meets

November

22 6TH ANNUAL EXPOSITION OF STEAM
Gold Coast Railroad
Ft. Lauderdale, Florida
11:00 a.m. to 5:00 p.m.
R. L. Beekman
811 SW 34th Street
Ft. Lauderdale, Florida
Phones 305 – 522-2937 or
305 – 524-5339

January

1 FLORIDA NEW YEARS' MEET
3½" – 4¾" gauges
Enos W. Yoder
1527 Ingram Avenue
Sarasota, Florida 33580

Regular Run Days

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2½" – 3½" – 4¼" – 7½"
Gordon French, Secretary
614 18th Avenue
Menlo Park, Calif. 94025
Phone 415 – 325-4209

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4th Saturday-Sunday each month
Hunter Park-Iowa & Columbia Ave.
Riverside, California
Francis H. Smith, Secretary
5536 Dewey Avenue
Riverside, California 92504
Phone 688-9533 or 683-9628

LOS ANGELES LIVE STEAMERS
1st Sunday each month
3½" – 4¼" – 7½"
Joel Corbin, Secretary
12723 Kittridge Street
North Hollywood, Calif. 91606

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1st Sunday of each month
3½" – 4¼" – 7¼", gauges
S. H. Galloway, Secretary
53 Brentwood Road
Beaurepaire, Quebec, Canada

PIONEER VALLEY LIVE STEAMERS
2nd Sunday each month
3½" – 4¼" – 7½"
Brenton W. Bamfather, Secretary
3 Fleetwood Drive
Sandy Hook, Conn. 06482

RAILROADERS CLUB OF SAN ANTONIO
3rd Sunday each month,
weather permitting
7½" gauge
Ces Beck
2626 McCullough Avenue
San Antonio, Texas 78212

JAMUL VALLEY RAILROAD
3rd Sunday each month
7½" gauge
Harry F. Haas
Route 1, Box 47 A
Jamul, California 92035

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Rialto, California 92376

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Fifteen words or less not including name or address: $2.00 in advance, 10¢ per word for additional copy. No commercial ads of any kind accepted for this column.

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Old electric and wind-up trains, also quality scale "O" gauge. Top cash. Al Stauter, Route 4, Medina, OH 44256.

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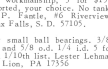

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